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IBM Technical Disclosure Bulletins

**Term:** L1 same (comb or comblike)

**Display:** 10 **Documents in Display Format:** CIT **Starting with Number** 1

**Generate:** ☐ Hit List ☒ Hit Count ☐ Side by Side ☐ Image

Search

Clear

Help

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Interrupt

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Show S Numbers

Edit S Numbers

Preferences

Cases

**Search History**

**DATE:** Wednesday, February 13, 2002 [Printable Copy](#) [Create Case](#)

**Set Name Query**  
side by side

**Hit Count Set Name**  
result set

*DB=USPT; PLUR=YES; OP=OR*

<u>L8</u>	L7 same (advantag\$ or useful\$)	1	<u>L8</u>
<u>L7</u>	L1 same (comb or comblike)	23	<u>L7</u>
<u>L6</u>	L2 same circuit\$	1	<u>L6</u>
<u>L5</u>	L2 same Comb\$	1	<u>L5</u>
<u>L4</u>	L2 same (microchip\$ or chip\$)	3	<u>L4</u>
<u>L3</u>	L2 same (advantag\$ or useful\$)	1	<u>L3</u>
<u>L2</u>	L1 same tunnel\$	13	<u>L2</u>
<u>L1</u>	electrode\$ same (DNA or nucleic or oligo\$ or polynucleotide\$ or protein\$ or carbohydrate\$)	2946	<u>L1</u>

END OF SEARCH HISTORY

(FILE 'HOME' ENTERED AT 09:38:27 ON 13 FEB 2002)

FILE 'MEDLINE, BIOSIS, CAPLUS, EMBASE' ENTERED AT 09:38:39 ON 13 FEB 2002

L1 12941 S ELECTRODE? (P) (DNA OR NUCLEIC OR OLIGO? OR PROTEIN? OR  
SACCHA

L2 102 S L1 (P) TUNNEL?

L3 0 S L2 (P) (MICROCHIP? OR CHIP?)

L4 0 S L2 (P) COMB

L5 4 S L2 (P) CIRCUIT?

L6 10 S L2 (P) (ADVANTAG? OR USEFUL?)

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L6: Entry 1 of 1

File: USPT

Jul 8, 1997

DOCUMENT-IDENTIFIER: US 5646420 A

TITLE: Single electron transistor using protein

Detailed Description Paragraph Right (9):

The thus obtained single electron transistor 1 has the protein 3 at which both ends a pair of the electrodes 5, 5 made of porphyrin are positioned to have a contact with the conductive substrate 7 and the electric conductive layer 8, which have a contact with an outer circuit to make the voltage applied between the electrodes. On the other hand, as one Flavin molecule is combined to the cysteine of the G segment of the protein 3, the conductor/one molecule/conductor can be obtained, in which the Flavin molecule acts as the quantum dot means 4 and the single electron transfer can be made through the one molecule due to the tunneling effect.

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L7: Entry 14 of 23

File: USPT

Sep 3, 1996

DOCUMENT-IDENTIFIER: US 5552274 A

TITLE: Method for detecting target sequences by oscillation frequency

Brief Summary Paragraph Right (13):

J. C. Andle et al. have reported in Sensors and Actuators B. 8 (1991) 191-198 the successful detection of DNA by the use of a sensor comprising a so-called SAW device having a comb electrode formed on the surface of a piezoelectric plate. In their report, the sensitivity of DNA detection is indicated to be 0.1 nanogram in mass sensitivity at a phase of 0.5.degree..

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L7: Entry 12 of 23

File: USPT

Dec 2, 1997

DOCUMENT-IDENTIFIER: US 5694188 A

TITLE: Reflection type liquid crystal display device having comb-shaped wall electrode

Detailed Description Paragraph Right (47):

Ethylhexyl acrylate (EHA) is used as a reactive monomer and KAYARAD HX-620 (available from Nippon Kayaku Co., Ltd.) is used as a reactive oligomer. Darocure 1173 (available from Merck & Co., Inc.) is used as photopolymerization initiator for these substances. E-8 (available from Merck & Co., Inc.) having a relatively high refractive index anisotropy is used as liquid crystal material. The monomer and oligomer, on the one hand, and LCD material, on the other hand, are mixed at a weight ratio of 2:8. The weight ratio of the monomer to the oligomer is 1:1. Then, 0.01 wt % of the photopolymerization initiator is added to the mixture. The resultant material is injected in the gap within the comb-shaped wall electrode 10, and the glass substrate 5 on which the common electrode 6 is formed is placed thereon. The resultant structure is sealed by an epoxy resin and then exposed to ultraviolet. Thus, the monomer and oligomer are polymerized.

Detailed Description Paragraph Right (50):

As regards polymer materials, EHA is used as a reactive monomer and R-551 (available from Nippon Kayaku Co., Ltd.) is used as a reactive oligomer. Darocure 1173 (available from Merck & Co., Inc.) is used as photopolymerization initiator agent for these substances. E-7 (available from Merck & Co., Inc.) having a relatively high refractive index anisotropy is used as liquid crystal material. Like Example 2, these polymer materials and liquid crystal material are injected in the gap within the comb-shaped wall electrode 10 and polymerized.

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L3: Entry 1 of 1

File: USPT

Oct 19, 1999

DOCUMENT-IDENTIFIER: US 5968745 A

TITLE: Polymer-electrodes for detecting nucleic acid hybridization and method of use thereof

Drawing Description Paragraph Right (36):

The measured reaction rate may then be compared to the known oxidation-reduction reaction rate of the transition metal complex with a single-stranded DNA. The tunneling distance between the mediator and the preselected base in either the hybridized or single-stranded DNA affects the oxidation-reduction reaction rate of the reaction between the mediator and the preselected base. Accordingly, hybridized DNA exhibits a different oxidation-reduction reaction rate than single-stranded DNA. The presence or absence of hybridized DNA at the preselected base can be determined by determining whether or not the measured oxidation-reduction reaction rate is the same as the oxidation-reduction reaction rate of the mediator and the preselected base in single-stranded DNA. Furthermore, the tunneling distance between the mediator and the preselected base will differ according to the bond distance between the preselected base and its pair, such that each possible base pairing may be distinguished from the others. The bond distance between the preselected base and its base pair is dependent upon the base which is paired with the preselected base. For example, the oxidation-reduction reaction rate for the oxidation of guanine paired with adenine differs from the oxidation-reduction reaction rate for the oxidation of guanine paired with cytosine, which in turn is different from the oxidation-reduction reaction rate for the oxidation of guanine paired with guanine, which is also different from the oxidation-reduction reaction rate for the oxidation of guanine paired with thymine. More specifically, the oxidation-reduction reaction rates for the oxidation of guanine follow the trend wherein single strand guanine is greater than guanine paired with adenine, which is greater than guanine paired with guanine, which is greater than guanine paired with thymine, which is greater than guanine paired with cytosine. Accordingly, the polymer-electrode and methods of the present invention are useful for detecting single-base pair mismatches at the preselected base or at the base pair adjacent to the preselected base.

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get 102(b)

L5: Entry 1 of 1

File: USPT

Jul 8, 1997

DOCUMENT-IDENTIFIER: US 5646420 A

TITLE: Single electron transistor using protein

Brief Summary Paragraph Right (9):

According to an aspect of the present invention, there is provided a single electron transistor operable at room temperature, which comprises a pair of electrodes used as a source and a drain, a supporting protein material positioned between the pair of electrodes, a quantum dot means supported by the protein material, and a control gate connected to the quantum dot means, said quantum dot means being combined to at least one amino acid selected from an amino acid sequence of the supporting protein material in order to be supported at a selected distance from the electrodes with a space suitable for tunnel phenomena generation.

Brief Summary Paragraph Right (14):

Therefore, according to a second aspect of the present invention, there is provided with a single electron transistor operable at room temperature, which comprises a lipid bilayer, each layer of which has hydrophobic groups oriented inside and opposed to each other, a protein material arranged in the lipid bilayer and having a segment or segments in a form of an .alpha.-helix conformation such as G, C .alpha.-helices of a bacteriorhodopsin, a quantum dot means combined to at least one amino acid unit of at least one segment of the protein material in order to be supported at a selected distance from the electrodes with a space suitable for tunnel phenomenon generation, a pair of electrodes used as a source and a drain and a control gate lying between the opposed hydrophobic groups and connected to the quantum dot means.

Brief Summary Paragraph Right (16):

On the other hand, the protein has 5.4 .ANG. of average turn space and 3.6 amino acid units in one turn in the .alpha.-helix stereo conformation, so that the distance in a direction of the helix axis becomes 1.5 .ANG.. That is, if the G segment of the protein has the following amino acid sequence:  
--Glu--Thr--Leu--Leu--Phe--Met--Val--Leu--Asp--Val--Ser--Ala--Cys--Val--Gly--Phe--Gly--Leu--Ile--Leu--,  
the distance in the helix axis direction is 1.5 .ANG.. Therefore, by selecting the combined position of the organic compound molecule (the quantum dot means) to the amino acid of the protein, which position may be out of or at the center of the protein between the electrodes or conductors, the distance between the inner complex salts (the upper and lower intermediate electrodes) such as porphyrin and the organic compound molecule (the quantum dot means) such as the Flavin can be adjusted in units of 1.5 .ANG. so that the distance can be fixed to such a distance (3 to 5 .ANG.) in which the tunneling phenomena or effects can be generated by the Flavin which can act as the quantum dot. Further, the quantum dot means is made of one molecule such as Flavin, so that the nearest transition level to the Fermi level can be higher than the electron thermal excitation level, resulting in a generation of the tunneling phenomena.

Detailed Description Paragraph Right (9):

The thus obtained single electron transistor 1 has the protein 3 at which both ends a pair of the electrodes 5, 5 made of porphyrin are positioned to have a contact with the conductive substrate 7 and the electric conductive layer 8, which have a contact with an outer circuit to make the voltage applied between the electrodes. On

the other hand, as one Flavin molecule is combined to the cysteine of the G segment of the protein 3, the conductor/one molecule/conductor can be obtained, in which the Flavin molecule acts as the quantum dot means 4 and the single electron transfer can be made through the one molecule due to the tunneling effect.

CLAIMS:

1. A single electron transistor operable at room temperature, which comprises first and second electrodes used as a source and a drain, respectively, a supporting protein material positioned between the first and second electrodes, a quantum dot means supported by the protein material, and a control gate connected to the quantum dot means, said quantum dot means being combined to at least one amino acid of the supporting protein material and being positioned between the first and second electrodes to generate tunnel phenomena.

11. A single electron transistor operable at room temperature, which comprises a lipid bilayer, each layer of which has hydrophobic groups oriented inside and opposed to each other, a protein material arranged in the lipid bilayer and having a segment or segments in a form of an .alpha.-helix conformation, a quantum dot means combined to at least one amino acid of the protein material in the lipid bilayer, first and second electrodes used as a source and a drain, and a control gate lying between the opposed hydrophobic groups and connected to the quantum dot means, wherein the quantum means is positioned between the first and second electrodes to generate tunnel phenomena.